REDISCOVERY OF *CLAVAGELLA (BRYOPA) LATA* (CLAVAGELLIDAE, BIVALVIA) FROM THE GULF OF MANNAR, SOUTHEAST COAST OF INDIA

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Plate 4

SUMMARY

The rediscovery of *Clavagella (Bryopa) lata* from Gulf of Mannar, southeast coast of India and its anatomical features are discussed and described. The present report of this species from Gulf of Mannar establishes a precise locality for the first time. This species is regarded as a true borer buried in massive scleractenian corals. Distinctive characters placing *C. lata* in the subgenus *Bryopa* are discussed in detail.

INTRODUCTION

Clavagellids, popularly called water-pot shells or pepper-pot shells, are highly modified sessile or burrowing bivalves usually found in muddy or coral reef habitat. The structure of the shell shows considerable variation due to the secretion of a calareous siphonal tube, causing much taxonomic confusion in this group. Some of the earlier studies on this group are those of Owen (1835), Gray (1858) and Purchon (1956, 1960). Smith (1962a) in his account on the historical zoogeography of the clavagellids states that about 100 species have been described in three genera, *Clavagella, Humphreyia* and *Brechites*. Recent works by Smith (1962), Soliman (1971) and Smith (1972) have thrown some light on their distribution and anatomy.

The only species of clavagellid previously recorded from the territorial waters of the Indian subcontinent is *Brechites dichotomus* (Chenu), being reported from South India as a common species (Hornell 1921), Madras Beach (Gravely 1941) and from Pamban, Krusadai Island (Satyamurti 1956). The present collection of *Clavagella (Bryopa) lata* from coral reefs around Manapam, Gulf of Mannar is of considerable importance since this is the first record of this species from Indian coasts and it fixes an accurate locality for the species as the original locality (Broderip 1834) was "Pacific (Cuming collection)."

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SYSTEMATIC SECTION

Class Pelecypoda

Order Eulamellibranchia

Family Clavagellidae

Genus *Clavagella* Lamarck, 1818

One valve fused with the tube, the other remaining free inside the anterior cavity. Both adductor muscles persist in the adult.

Subgenus *Bryopa* Gray, 1847

Anterior end of the shell smooth, left valve embedded in rock or hard substratum, short tubules around the valve, siphonal tube opening in the shape of figure of '8' in cross section, plaited ruffle present in the tube.

Clavagella (Bryopa) lata Broderip, 1834

Plate 4. Text figure 1

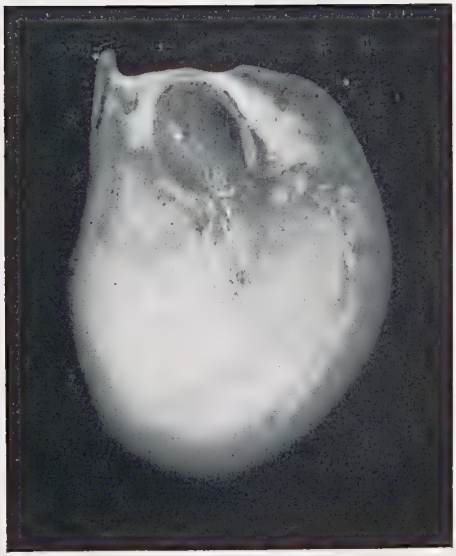
Clavagella lata Broderip, 1834: 116; Broderip, 1835: 265.
Clavagella (Bryopa) lata. Smith, 1962: 171 (revision).

Diagnosis: The distinctive characters are those of the subgenus *Bryopa.*

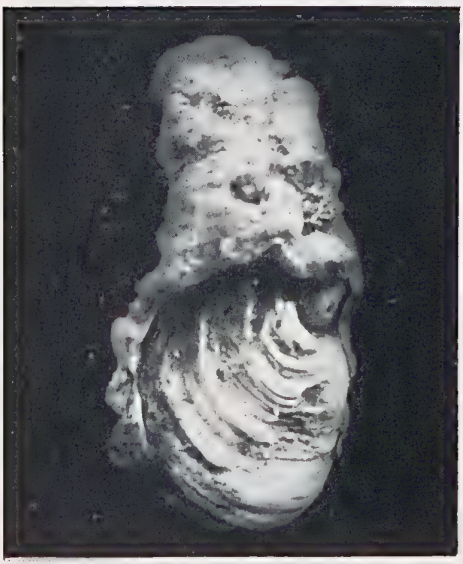
Description: Left valve permanently cemented to the wall of the burrow (Plate 4, A), which continues as the calcareous tube of the animal. Free right valve is larger than the left (Plate 4, B), and varied from 10-18 mm in length and 8.5-16.6 mm in depth. Externally the shell is light yellow with concentric striations representing growth rings (Plate 4, C). There are no hinge teeth on either valve but a prominent ligament is present. Internally the shell is pearly in appearance, and both adductor impressions are prominent in the shells. There is a raised ridge in the area of insertion of the posterior adductor muscle in the free valve. The postero-dorsal angle of the free valve forms a distinct wing, which is a distinguishing feature of all the specimens examined. The shape of the shell varied from rounded to rectangular in outline. The calcareous siphonal tube is short with longitudinal grooves laterally giving the shape of figure '8' in cross section. Traces of plaited ruffles are present along the tube. The tube protrudes out beyond the surface of the coral into which animal has bored.

The body is enclosed in a thin sheath of brown mantle with a pallial opening in the ventral side (Plate 4, Fig. 1). Mantle edges are thick with longitudinal musculature forming accessary adductor muscle. Both adductors persist in the adult as well developed structures, the posterior adductor being exactly double the size of anterior adductor muscle. There is no pedal retractor muscle as the foot is nonfunctional and vestigial. The visceral cavity is filled with the visceropedal mass which is flattened anteriorly and is separated into gut and glandular part. The foot is finger-shaped, pointed, laterally compressed and is situated at the anterior part of the visceral mass as a small protruberance. The mouth is bordered by paired labial palps in between anterior adductor muscle and the visceral

A



B



C

D

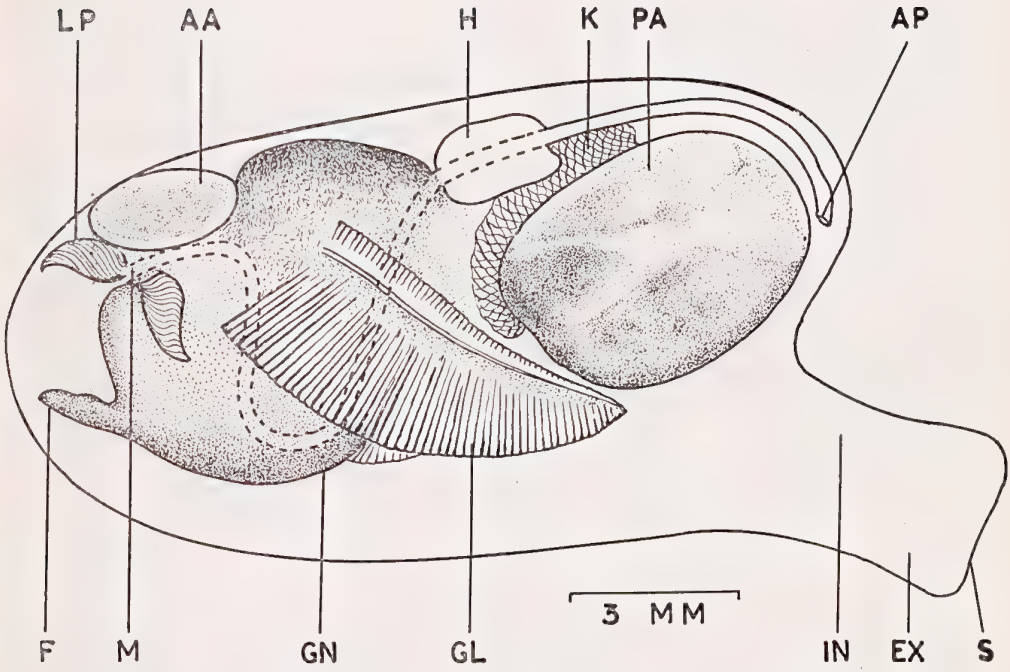
PLATE 4. *Clavagella (Bryopa) lata* (x 4). A. Left valve attached to coral, internal view. B. Free right valve, internal view. C. Right valve showing concentric ring and calcareous tube. D. Body of the animal.

mass. The gills originate from the dorso-lateral region of the visceral mass and near the beginning of the siphon, ventral to the posterior adductor muscle and do not extend into the siphon. The posterior part of the visceral mass contains the gonad, immediately above the posterior adductor. The intestine is very little coiled, the rectum being situated in the postero-dorsal part of the visceral mass. The siphons are fused into a muscular contractile tube, which, when contracted, is black in colour with concentric rings. In life the siphons protrude out of the calcareous tube the two canals opening through a single orifice surrounded by a number of minute finger-like fleshy tentacles. Internally the siphon is divided by a median, longitudinal septum to form inhalent and exhalent canals, the insertion of the septum forming lateral grooves along the external wall of the siphon.

Material: Five specimens were collected from Manauli Island (9° 13'5" N, 79° 8'7° E) in Gulf of Mannar. They were seen buried in massive scleractenian corals, *Porites* and *Goniastraea,* along with other common boring bivalves such as lithophags, gastrochaenids and pholadids. *C. lata* makes only shallow burrows compared with other powerful borers like lithophags and gastrochaenids. Two of the specimens collected were damaged when taken out of the burrow and all of them were preserved in 5% formaldehyde solution for subsequent examinations. The specimens have been deposited in the Reference Collection Museum of Central Marine Fisheries Research Institute at Mandapam Camp (Reg. No. CMFRI-M.335).

Boring habit: Clavagellids are generally described not as true borers but as sedentary forms or animals embedded in holes or other substratum. Broderip (1835) described *Clavagella lata* as a true borer which burrows by chemical secretion. Soliman (1971) explains in detail the method of boring of *Clavagella* sp. and describes it as a mechanical borer. The rough abrasive outer surface of the right shell valve, the corresponding ridges and grooves in the innerside of the burrow, the calcareous accumulation in the latter, the eroded peristracum are some of the evidences for mechanical mode of burrowing in *Clavagella* sp. (Soliman, 1971). Yonge (1951) while describing the adaptions for rock boring in *Platyodon cancellatus* states that the protection of the siphonal process by a layer of periostracum is a prerequisite to the assumption of deep burrowing (or boring) mode of life. In the present species, the presence of a tough periostracum in the siphon along with the absence of hinge teeth, eroded right valve, a prominent ligament, and burrows without any calcareous lining are some of the strong evidences to treat this as a true mechanical borer.

Remarks: The subgenus *Bryopa* is easily distinguished from other subgenera of the genus *Clavagella* by the presence of periodical expansion of the calcareous siphonal tube while subgenera *Dacosta* and *Clavagella* s.s. are characterised by a simple siphonal tube and the tube in cross section being either circular or multiangular in outline. In *Bryopa* and *Dacosta* the anterior end of the tube is smooth and rounded with small, very short tubules through the tube around the valve and in *Clavagella* s.s. there are spine-like tubules on the anterior portion of the tube. Anatomically *Bryopa* differs from *Dacosta* by the non extension of gills to the siphon. *Clavagella lata* is placed in the subgenus *Bryopa* because of the precence of traces of plaited ruffle at the siphonal end of the tube and a postero-dorsal wing in the free valve. The siphonal tube in cross section gives the shape of figure '8' in this species.



Text Fig. 1. Diagram of interior of *Clavagella (Bryopa) lata.*
AA — anterior adductor, AP — anal papilla, EX — exhalant siphon, F — foot, G — gut, GL — gills, GN — gonad, H — heart, IN — inhalant siphon, K — kidney, LP — labial palp, M — mouth, PA — posterior adductor, S — siphon.

The present material closely resembles the type of specimen of *C. lata* deposited at British Museum in shape and in the presence of strong adductor impressions in the fixed valve but differs in the presence of a postero-dorsal wing in the free valve and plaited ruffle in siphonal tube. Both are buried in hard substratum and interally the shell is pearly in appearance. The present specimen is easily separated from *Clavagella* sp. from the Red Sea (Soliman, 1971) by the presence of a wing in the free valve and the calcareous siphonal tube protruding out beyond the surface of the substratum.

Smith (1962) mentions that the earliest record of *Bryopa* is from strata of late Oligocene (Aquitanian) age in France and there are several extant forms in the Mediterranean and a few in Indo-Pacific. Originally described as *Clavagella lata* by Broderip (1834), the type locality is given as " Pacific (Cuming Collection)". The present report of this species from Manauli Island, Gulf of Mannar, southeast coast of India establishes a precise locality for the first time. The record of *C. (B.) lata* from Indian waters extends its distribution from Pacific to Indian Ocean and a thorough search in other parts of both oceans may bridge the gap in distribution.

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